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ABSTRACT

An intervention pre- and posttest design was used to study conditions that facilitate children's self-regulation of problem solving activities. In two studies, children were trained to solve a three disc Towers of Hanoi problem. After training, they were asked to solve the problem, describe how they solved it, and perform a four disc generalization task. In the first study, a total of 125 first- through third-graders were assigned to one control and three training conditions. In training, children: (1) practiced solving the problem; (2) watched an adult model solve the problem in the most efficient way; or (3) viewed a video recording of their own prior performance on the problem. Training conditions had differential effects on performance. Training with a model hindered descriptions of solutions and performance of the generalization task, while the video training condition facilitated the regulation of problem solving activities. In the second study, a total of 60 first- and second-graders were placed in one of three video training conditions or a control condition. Children: (1) viewed a recording of their prior performance on the three disc problem; or (2) viewed a video recording of a child model's inaccurate performance on the problem; or (3) viewed a video recording of a child model solving the problem in the most efficient way. Preliminary analyses revealed the superiority of training in which children viewed their own performance. (Author/RH)

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VIDEO TRAINING AS A MEANS FOR ENHANCING SELF AWARENESS IN PROBLEM SOLVING AMONG YOUNG CHILDREN

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Abstract

An intervention pretest-post-test design was used to examine conditions which may facilitate children's self regulation of problem solving activities. In Studies 1 and 2, children were trained to solve a three disc Towers of Hanoi problem. Following the training, the children were asked to solve the three disc problem, describe how they reached their solution, and solve a generalization task. In Study 1, three training procedures and a control were used for 125 children. In each training procedure, the children (1) practiced solving the problem; or (2) observed a live adult model solve the problem in the most efficient way; or (3) viewed a video recording of their prior, often inaccurate, performance on the three disc problem. The results revealed that the training conditions had differential effects on performance as the Model training condition hindered the children's descriptions of their solutions and their performance of the generalization task, while the Video training condition facilitated the regulation of problem solving activities. In Study 2, 60 children were placed in one of three video training conditions or a control. Children (1) viewed a recording of their prior, often inaccurate, performance on the three disc problem; or (2) viewed a video recording of a child model's inaccurate performance on the problem; or (3) they viewed a video recording of a child model solve the problem in the most efficient way. Preliminary analysis have revealed the superiority of the Video Self training condition.

Introduction.

Contemporary research on learning emphasizes cognitive activities such as heuristic strategies, metacognitive awareness, and self regulatory activities (see Brown, Campione, Bransford, & Ferrera, 1983 for review). While Piaget's studies (1976; 1978) have suggested that conscious self-regulation emerges ontogenetically, there have been numerous studies that have demonstrated that very young children show some form of plan and awareness of their actions in solving problems (e.g., Klahr & Robinson, 1981; Wellman, Ritter, & Flavell). The mechanism for the emergence of these self-regulatory actions, however, is not clear. The present studies are concerned with the way in which children come to focus and reflect on their own actions in a problem solving situation, and the extent to which such a focusing may facilitate the development of self regulation.

Method.

Subjects.

In study 1, 125 children in grades 1-3 attending private elementary schools in a large metropolitan area participated in the study. Within each grade children were randomly assigned to one of three training conditions or a control.

Procedure and Materials.

Each child was tested individually on three occasions, approximately one week apart. During the first meeting, each child was asked to complete a three disc Towers of Hanoi problem

while being video taped. At the second meeting, each child was randomly assigned to one of three training conditions. The Practice condition involved repeated practice of strategies, the Model condition involved viewing the most efficient solution by an adult model, and the Video condition involved observing a video taped recording of their prior, often inaccurate performance. After training and successful completion of the three disc problem, the children were asked to tell the examiner how they reached their solution to the problem. Descriptions were audio taped and transcribed for later analysis. The children were then asked to solve a four disc problem. A record was kept of every move that was made. During the third meeting, approximately one week later, children were asked to solve the three disc problem, describe how they achieved their solutions, and to again complete the 4 disc generalization task.

Results.

Three Disc Problem.

The effects of the training conditions on the number of moves to complete the problem were examined by a two-way 4 (Condition) by 3 (Grade) ANOVA. There was a significant main effect for condition, $F(3, 124)=16.57$, $p<.01$, no main effect for grade, and no interaction. Scheffe post hoc comparisons revealed Control children required more moves to complete the problem ($M=14.5$) than did those in Model ($M=7.4$), Practice ($M=9.0$), and Video ($M=10.1$) conditions ($p<.05$).

Descriptions.

Children's descriptions were first categorized as either accurate or inaccurate. Chi square analysis showed there was a significant association between accurate descriptions and condition ($X(3)=18.86$, $p < .01$). In the Practice condition 81.8% gave accurate descriptions, in the Video 81.3% did so, while 60% in the Model did so, and only 36.7% in the Control did so. Four types of explanations could be distinguished: inaccurate, accurate account with demonstration, accurate account without demonstration, or description with an attempt to conceptualize. There was a significant relationship between type of explanation and condition, $X(9)=24.79$, $p<.01$ (Table 1). Incomplete descriptions were most common for Control subjects, while the Video subjects tended to give accurate descriptions with demonstration.

Table 1. Children's explanations: Percentage of response types presented by condition.

	Conditions			
	Control	Model	Practice	Video
Response Type				
Incomplete	63.3	40.0	18.2	18.8
Accurate	20.0	43.3	45.5	34.4
Accurate w/ action	10.0	16.7	30.3	40.6
Conceptual	6.7	0.0	6.0	6.2

Four Disc Problem.

On the four disc generalization task a two-way ANOVA among the children who successfully solved the problem revealed significant main effects for Condition, $F(3, 97)=4.5$, $p<.01$, and Grade, $F(2, 97)=5.83$, $p<.01$, and no interaction. Scheffe post hoc analyses revealed that third-graders required significantly fewer moves than first-graders ($p<.05$). Scheffe post hoc analysis revealed that subjects in the Video condition required significantly fewer moves than did subjects in the Model condition ($p<.05$). A two-way ANOVA revealed that these findings were maintained one week later (Table 2). Additionally, Scheffe post hoc comparisons revealed that subjects in the Video condition performed significantly better than those in the Control and the Model conditions ($p<.05$).

Table 2. Means & standard deviations for the number of moves for post-training & delay generalization task presented by condition.

	Training Conditions							
Tasks	Control		Model		Practice		Video	
	M	SD	M	SD	M	SD	M	SD
Four Disk	36.0	19.3	45.0	22.2	34.2	17.1	30.4	11.5
Delayed four disc	41.0	18.5	33.6	12.2	31.0	14.5	25.9	11.6

Study 2.

In study 2, the experience of switching perspective through video presentation was more closely examined through three video

training conditions. 60 children in grades 1-2 attending private elementary schools in a large metropolitan area participated in the study. The procedures were identical to that of the first study except for two training conditions. The Video Self and Control conditions remained the same. The new conditions were (1) children viewed a video taped child model's efficient solution of the problem, and (2) children viewed a video taped child model's inaccurate performance. Preliminary chi square analysis on children's ability to solve the four disc generalization problem revealed significant differences in the number of children who could solve the problem, $X(3)=11.3$, $p<.01$. While 100% of children in the Video Self condition could solve the problem, only 64% of those in the Video Accurate Model, 58% of those in the Video Inaccurate Model and 38% in the Control conditions successfully completed the task.

Conclusions.

Study 1.

1. Children's ability to complete the Towers of Hanoi problem was not directly related to their awareness. The children in the three training conditions could solve the problem, however, there were differences in how they described their actions.

2. Differences in descriptions were related to training conditions with children in the Practice and Video conditions providing more accurate descriptions than the those Model or Control conditions. Further, those in the Video condition

focused their descriptions on action by providing active demonstrations in conjunction with their descriptions.

3. On the four disc generalization task, children in the Video condition were most efficient in solving the problem, while those in the Model condition were least efficient. These findings were maintained over a week's time.

Study 2.

1. In examining the mechanism for learning stimulated by the Video condition, preliminary findings indicate that children in the Video Self condition are superior in solving the four disc generalization task when compared to those in the other conditions. The Video Self condition in studies 1 and 2 was unique in that the children observed their own mistakes in action.

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